

HOW TO LAY PORTLAND CEMENT FLAGSTONE WALKS.

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The writer having had considerable experience with cement walks, both as engineer and contractor, has written this article to cover the answers to many inquiries concerning the details of their construction.

The materials required for a small job are six or eight scantlings of the best white pine, 2 x 4 inches x 16 feet, dressed on all sides; half a dozen cross-heads, 2 x 4 inches and as long as the walk is wide: some ash or oak ribbons, 3½ inches wide and 10 or 12 feet long, 1, 3, and ½ inch thick, to be used in place of scantlings on curved walks. A small, round screen, having 64 meshes to the square inch; a large screen, 22 inches wide by 6 feet long, having 16 meshes to the square inch; an iron shod straight edge, 1½ feet longer than width of walk; many iron pins and wooden stakes; also shovels, hoes, axes, picks, steel squares, iron wheelbarrows, rakes, hammers, pounders, carpenter's level, finishing tools and a tool-box.

A careful and experienced man should have charge of the work, as errors and mistakes in this business are very costly, and there are many ways of ruining a walk. The lines and grades should be given by a surveyor, the stakes being set with the help of instruments. The foreman should make sure that all of the stakes are right. It is possible that a wrong grade has been used. It makes a very great difference about the cost of a walk whether there is good or bad management. It is of great advantage to have skilled help, especially a skillful finisher, in putting down cement walks.

Street walks should be made four inches thick. Inside walks are narrower and may be thinner.

One barrel of cement is sufficient for forty-five square feet of walk. Only very high grade, slow-setting Portland cement is suitable for cement walks. One cubic yard of gravel is necessary for seventy-five square feet of walk, and must be clean and sharp. Sand is screened from the gravel with the large screen, and should be coarse.

On wet and heavy ground, or where the winters are very severe, a foundation five or six inches thick, made of gravel or of soft coal cinders, sprinkled and well tamped, is

necessary. Cinders make the best foundation.

A stout chalk line of seine twine is used in checking grades and lines when setting scantlings for a walk. Street walks have a slope of a quarter of an inch to the foot toward the curb, sometimes more. In parks and some other places, instead of a side slope, the walk is made crowning in the center. If there is a lawn between the curb and walk, the drainage and appearance will be greatly improved by setting the walk one inch higher than the curb for each foot of width of lawn.

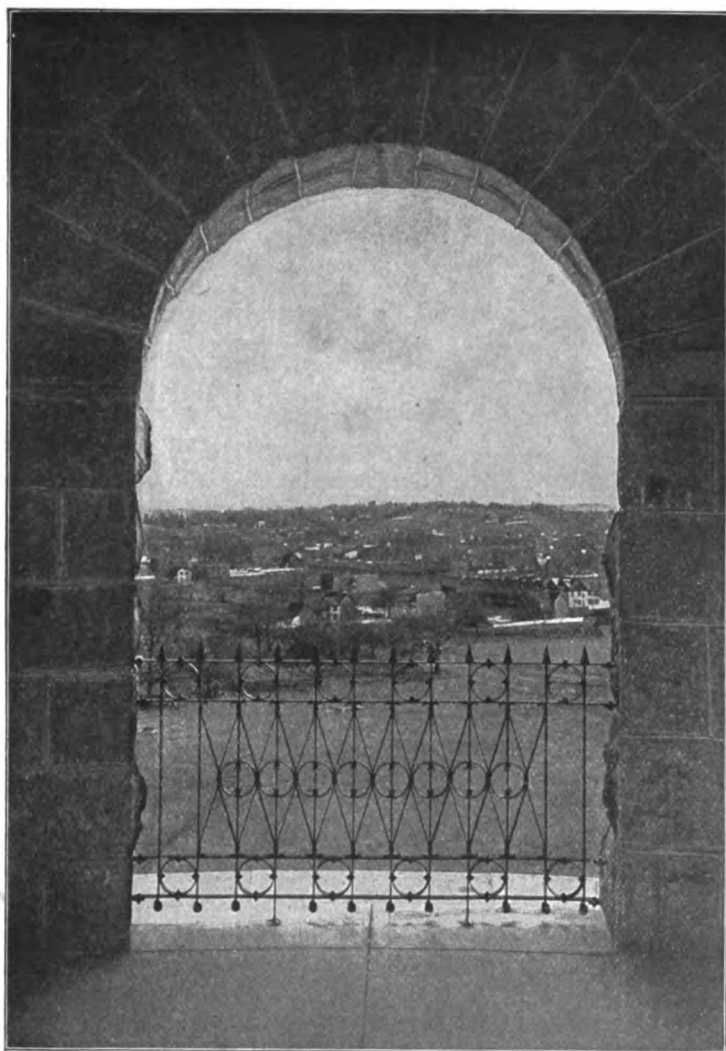
Concrete is mixed one part of cement by volume to six of gravel; top mortar is mixed one part of cement by volume to two of sand; separator is mixed one part of cement by volume to four of sand; dryer is mixed one part of cement by volume to one of sand.

For the concrete, a good-sized box is used, the gravel and cement placed in it, and this is all mixed up dry, turned over four or five times, but not wet until ready for use, then sprinkled, and turned over until all is damp; then immediately put in place with wheelbarrows. The top mortar is prepared at the same time, in another box, and in same manner. The separator is mixed in a wheelbarrow dry. The dryer is obtained by screening equal quantities of cement and sand through the small screen, and mixing it dry and using it dry at the proper time.

In steps, driveways or crossings, where walks will have very hard usage, concrete should be mixed one to five.

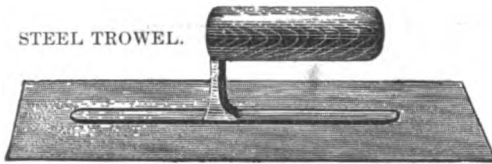
The scantlings are placed in position with cross-heads between and plenty of stakes outside to hold them securely. Surveyors' stakes are good. Spaces are marked off on the scantlings, indicating the joints of the blocks, which should form rectangles (not squares) for good looks. Wire nails are driven in part way, on outside, opposite the joints, to refer to later. The cross-heads are then placed at the joints, and secured with iron pins driven into the ground.

The concrete is packed in and well rammed until three and one-quarter inches thick, as shown by passing the straight-



**VIEW THROUGH OBSERVATORY ARCH, ROCKFORD PARK,
WILMINGTON, DEL.**

edge over the frame, which is outside of the walk, and enough concrete is usually laid to make five or six blocks at once, if one has a large contract. This leaves three-quarters of an inch for the thickness of the top mortar. The iron pins holding the cross-heads are all taken out long before the



STEEL TROWEL.

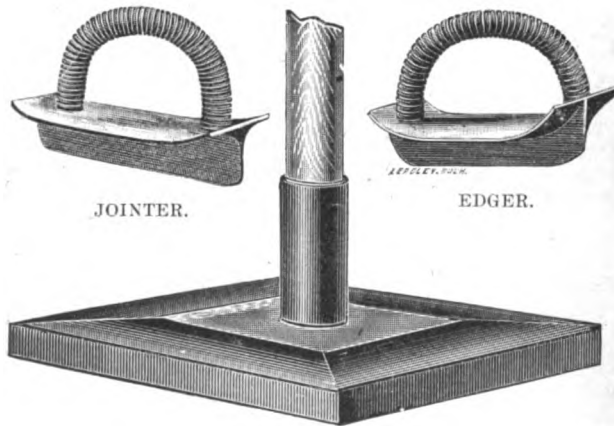
concrete is all in, and the cross-heads are held by concrete packed around them. After enough concrete is in place, the cross-heads are gently rapped with a small hammer, taken out carefully and the moist separator brought in with a shovel and well packed into the spaces left by the cross-heads, then rammed a little with a pounder. "Moist" means just wet enough to pack well.

Some people do not use cross-heads, but prefer pieces of clap-board, cut down to

of each block, renders it smooth and true; trowels are used all the while to prevent the waste, or loss, of good mortar over the sides of the scantlings.

A steel trowel rubbed over the walk soon brings water to the surface, or at least moisture, which is taken up by a liberal sprinkling of the dryer. The dryer is carried in a pail and scattered by hand, then rubbed in with a float, or wooden trowel.

The straight-edge (one and one-half inches thick) is laid flat across the walk with the iron in line with the wire nails, in order to be exactly in line with the joints; a man, standing on this, and using a stout-pointed trowel, keeping the trowel always against the straight-edge, cuts down through the walk, working all the way across, and finally passes his trowel back and forth from one side to the other, making a clean-cut joint, and does the same with the other joints. When clap-boards or tar paper are in the joints they are cut only one inch deep. Some one follows after, with the finishing tools, jointer and edger, and polishes up the edges. A plasterer's trowel is now used to give each block a fine finish. If the blocks



JOINTER.

EDGER.

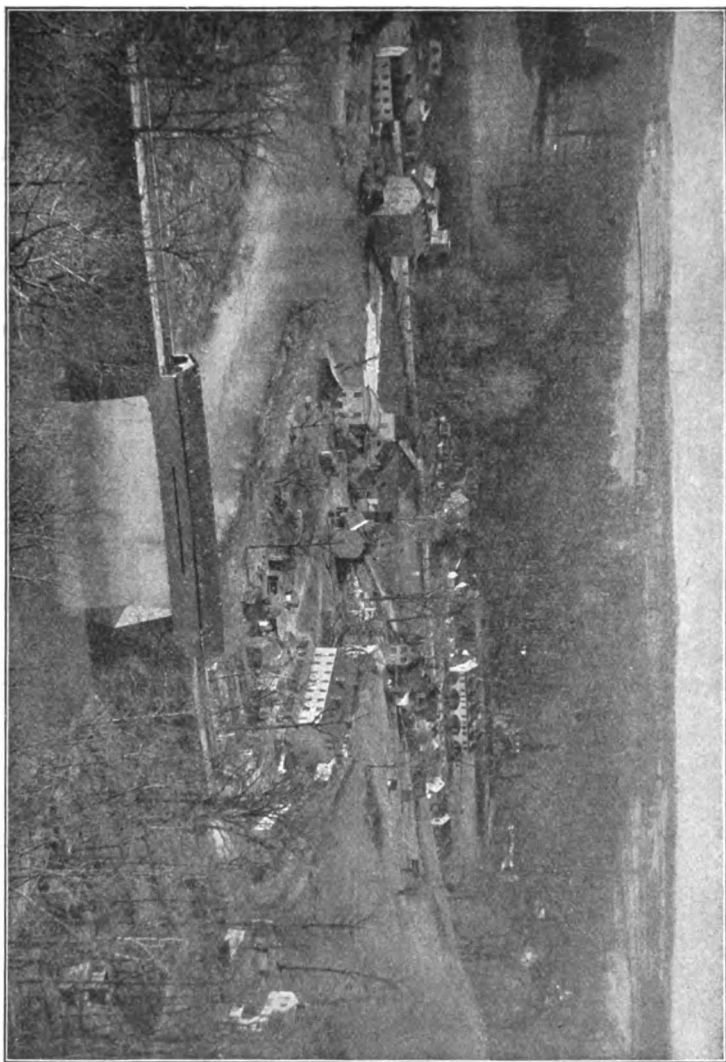
IRON POUNDER.

three inches wide, and set on edge at each joint, narrow side up; these are left in the walk, and finally rot out.

Top mortar is next wheeled in and spread over the concrete quite soft and wet as compared with the concrete, which just shows moisture when pounded: but the top mortar should not be pounded and must be wet enough to be worked easily under the trowel and straight-edge. The latter, moved by a man on each side of the walk, pushing it back and forth, up and down the length

happen to be wet, one must wait awhile, for a walk must not be finished wet. The atmosphere will quickly dry up some of the moisture.

When the dot roller is to be used on a walk, it looks better to have a border all around each block, four inches wide. A chalk line held taut on the walk at points already marked with a pair of steel compasses and pressed down firmly by passing a steel trowel carefully over it, makes a very clean-cut line. The chalk line is then taken

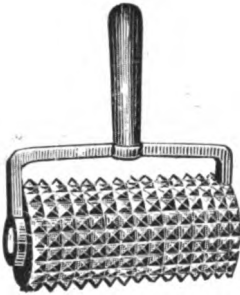


VIEW FROM OBSERVATORY, ROCKFORD PARK, WILMINGTON, DEL.

away. The walk should be rolled crosswise, not lengthwise.

Walks must be well protected for several days after laying, and ought to be frequently sprinkled in very hot weather, if exposed to the sun. Wooden covers are often used. Sprinkling is a benefit in all cases.

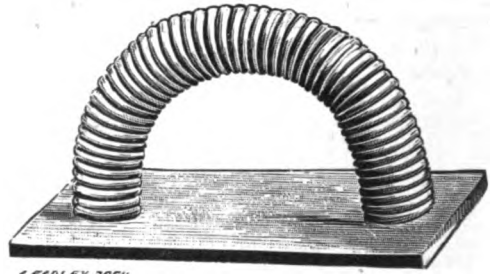
A very small steel trowel is useful in touching up bad spots. A bricklayer's trowel is the kind with which to cut joints. At the beginning of the day's work, a clap-board or a piece of tar paper three inches wide may be used against the walk laid last, or against any block that has been laid long enough to get very hard. Wet sand is good



BRONZE DOT ROLLER.

to place between a curbstone and cement walk, or against the stone walls of a house where a walk would otherwise touch them.

Very wide walks are laid in several courses, but it is bad practice to break joints: blocks ought not to contain more than forty square feet unless made extra thick in the middle.



BRONZE NAME STAMP.

It is better not to have more than thirty square feet in each block. Scantlings should not be removed until the day after the walk has been laid, and then rapped downward until loose, after which they may be carefully taken up.

Coloring matter should not be used in a cement walk: it may look very fine at first, but eventually fades, and then has a bad appearance.

Very fine, broken quartz is sometimes mixed with the sand in the top mortar of cement walks to improve their wearing qualities.

A name stamp may be used before the cement sets for marking the maker's name.

